

Siemens Mobility – Intelligent Traffic Systems
Technical Note

Pontefract Road / Lambra Road, Barnsley
Henry Boot Construction
857493234-SIE-00-XX-TN-Y-0001
S4 - Issued for construction approval
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1 Introduction

1.1 Document Scope

1.1.1 This document provides a traffic signal design pack for the provision of a traffic control system at Pontefract Road / Lambra Road, Barnsley in accordance with Barnsley Metropolitan Borough Council (BMBC) specification and contains:

- Design Considerations
- Design Risk Assessment

1.2 Project Overview

1.2.1 Siemens has been instructed to complete traffic signals design for two new junctions on Lambra Road in Barnsley.

1.3 Design Brief

1.3.1 To produce a detailed traffic signal design, including all associated documentation, in accordance with our responsibilities as CDM designer.

1.4 Related Documents

1.4.1 This document supports the following documents:

- Traffic signal design drawing(s) - 857493234-SIE-00-XX-DR-Y-0001
- Controller Specification(s) - 857493234-SIE-00-XX-SP-Y-0001

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2 Design Considerations

2.1 Personnel

2.1.1 The key personnel involved in the traffic signal design hold all relevant and necessary qualifications. Competence of staff is established under Siemens' QA procedures.

2.2 Scheme Safety Argument

2.2.1 The following safety argument is intended to;

- make the case that potential hazards have been reduced to an acceptable level;
- establish that any aspects of the scheme outside the scope of, or not in accordance with, Departmental Advice, Standards or TSRGD are adequately safe;
- justify the speed related design standard applied to the scheme

Potential Hazards

2.2.2 A design risk assessment has been completed detailing a list of possible hazards and an assessment of the risks posed using the severity × likelihood = risk factor methodology (refer to section 3 Design Risk Assessment for further details). Steps have been taken to ensure, where reasonable and practical, risks are eliminated from the design.

2.2.3 Where eliminating risk has not been possible and the risk factor is evaluated to be higher than an acceptable level, proposed control measures have been introduced to control the risk. For a full list of residual hazards, refer to paragraph 3.4.1, Residual Risks.

Speed Related Design

2.2.4 A cruise speed survey was carried out on site. Pontefract Road Eastbound was measured to have an 85th percentile speed of 13.63ms^{-1}. Pontefract Road Westbound was measured to have an 85th percentile speed of 14.00ms^{-1}. Lambra Road was measured to have an 85th percentile speed of 11.29ms^{-1}.

2.2.5 Whilst an informal speed survey has been completed, it is not a substitute for a detailed speed survey to determine an accurate 85th percentile speed. This is required to confirm various elements, such as, but not limited to;

- Site stopping distance (forward visibility)
- Detector type
- Speed detection requirements
- Signage requirements and locations
- MOVA loop locations

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Traffic signal layout

2.2.6 Pontefract Road will have a primary and secondary signal per approach. Lambra Road will have two primaries and one secondary. A 'No U Turn' box sign will also be used to ban this movement. The two crossings across Lambra Road will be Toucan whereas the one across Pontefract Road will operate as a Puffin.

Method of control and detection

2.2.7 MOVA and SCOOT loops will be used on this site for detecting vehicles and monitoring congestion. All crossings will utilise on-crossing detectors, to cater for slow moving pedestrians, and the crossing on Pontefract Road will utilise kerbside detectors to remove unwanted pedestrian demands.

Intergreens

2.2.8 Vehicle to vehicle intergreens have been calculated in accordance with the Department for Transport Traffic Advisory Leaflet 1/06 General Principles of Traffic Control by Light Signals (TAL 1/06). Intergreens between traffic and pedestrians have been calculated in accordance with TAL 5/05 Pedestrian Facilities at Signal Controlled Junctions. Calculated intergreens have been assessed and adjusted by an experienced traffic signal design engineer to suit local conditions.

2.2.9 With the use of MOVA control, and the absence of speed detection equipment, intergreens from high speed approaches have been increased by 2 seconds.

Red Lamp Monitoring (RLM)

2.2.10 On detection of a RLM1 fail in the controller, an additional 2 seconds will be added to the intergreen from the traffic phase to any conflicting pedestrian phase.

2.2.11 On detection of a RLM2 fail in the controller, any pedestrian phase which conflicts with the traffic phase will be inhibited.

Passive / Non-passive poles

2.2.12 A pole risk assessment has been carried out to determine whether the use of passive equipment is appropriate at this site. The assessment evaluates the relative risk of traditional steels poles vs. passive poles taking account of pedestrian presence and environmental conditions such as location of the pole, equipment on the pole, likely speed of vehicles etc. If the assessment shows a limited benefit from one to the other, economic factors are introduced to help determine the most suitable solution for this site.

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2.2.13 The passive pole risk assessment completed for this site has determined that some poles should be passively safe, but not all. Non-passive poles have been specified everywhere as there was a pedestrian presence witnessed on site, and also to keep the pole type consistent across the site.

2.3 Standards and Approvals

2.3.1 The proposed layouts are in accordance with the Departmental Advice, Standards, the TSRGD and BMBC specifications.

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3 Design Risk Assessment

3.1 General

3.1.1 A design risk assessment (DRA) has been completed to assess and consider the implications of the proposed traffic signal design with regards to safety. The risk assessment considers the severity and likelihood of a hazard to cause harm or loss in the form of a risk factor.

3.1.2 Any hazards with a risk factor of 8 or below are deemed to be at an acceptable level of risk. Any hazards above are considered unacceptable and a control measure should be introduced to reduce the likelihood of a hazard causing harm or loss.

3.1.3 Where reducing the risk factor to a level of 8 or below has not been possible, even after the introduction of a control measure, the hazard in question is deemed as having a residual risk associated with it. All hazards within the DRA which have a residual risk are listed in section 3.4 of this document.

3.1.4 Where residual risks have been identified, they are distinguished on the drawing with a hazard symbol, as shown in Figure 1.



Figure 1

3.1.5 There may be other hazards identified in the DRA which, although brought down to an acceptable risk factor, it is felt are worth highlighting. These hazards are listed in section 3.5 of this document.

3.2 Severity Explained

No injury or loss (1)

3.2.1 In effect this is a near miss.

Minor injury or loss (2)

3.2.2 A minor injury can be treated using first aid and does not result in lost time beyond the application of first aid. Minor loss would be any costs incurred by the incident which together amount to less than £100.

Significant injury or loss (3)

3.2.3 A significant injury to be treated using professional medical attention and would result in lost time beyond the application of medical assistance. Significant loss would be any costs incurred by the incident which together fall between £100 and £2,500.

Major injury or loss (4)

3.2.4 Any reportable accident resulting in permanent injury or disfigurement is considered as a major injury. Major loss would be any costs resulting from an incident which together fall between £2,500 and £10,000.

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Fatality (5)

3.2.5 Any incident resulting in a fatality or losses in excess of £10,000 is considered as a severity 5 incident.

3.3 Risk Factor

3.3.1 The risk factor is calculated as:

Risk Factor = Severity × Likelihood

Severity \ Likelihood	Very Unlikely (1)	Unlikely (2)	Possible (3)	Likely (4)	Very Likely (5)
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Low risk	Medium risk	High risk

3.4 Residual Risks

3.4.1 Any residual risks identified as part of the design risk assessment are detailed below.

Hazard Identified	**Initial Risk Rating**	**Control Measure**	**Revised Risk**
D1 - Horizontal alignment Lambra Road approach has a sharp bend and is under a bridge. This greatly restricts visibility to the junction. Pontefract Road EB approach is a long gradual bend.	16	Signs to Diag. 543 'Traffic Signals Ahead' to be installed on Lambra Road. Off side secondary head to be installed on Pontefract Road EB to greatly increase signal visibility around the bend.	12

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3.5 Other Notable Hazards

3.5.1 Other hazards which have been deemed as being beneficial to be highlighted, even though the risk rating has been lowered to an acceptable level, are detailed below.

Hazard Identified	Initial Risk Rating	Control Measure	Revised Risk
D2 - Vertical alignment Pontefract Road EB is a downhill approach and Pontefract Road WB is an uphill approach. Signal visibility is obstructed on the EB approach due to bend and downhill approach.	12	Signs to Diag. 543 'Traffic Signals Ahead' to be installed on Pontefract Road EB.	8
D5 - Visibility of traffic signal heads Particularly on Lambra Road, the bend and high wall will obstruct signal visibility. The bend and 'Low Bridge' sign on Pontefract Road EB may obstruct a primary signal.	12	Signs to Diag. 543 'Traffic Signals Ahead' to be installed on Lambra Road. Off side secondary head to be installed on Pontefract Road EB to greatly increase signal visibility around the bend	8
D6 - See through issues Risk of pedestrians seeing opposing signals on the centre island.	15	Narrow field of view filters to be installed on all centre island ped indicators to minimise see through issues.	5
D7 - Physical obstructions Particularly on Lambra Road, the high wall will obstruct signal visibility. The 'Low Bridge' sign on Pontefract Road EB may obstruct a primary signal.	12	Signs to Diag. 543 'Traffic Signals Ahead' to be installed on Lambra Road. Off side secondary head to be installed on Pontefract Road EB to greatly increase signal visibility around the bend	8

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D9 - Opposed right turning traffic Pontefract Road EB has a right turning movement which is opposed by Pontefract Road WB. There is no storage for waiting vehicles. Supplied traffic flows show low numbers of right turning vehicles, greatly reducing the need to provide an unopposed right turning movement.	12	Integreen to be extended from Pontefract Road EB allowing vehicles to clear if needed.	4
D10 - Queuing traffic - sufficient storage Vehicles waiting to turn right off Pontefract Road EB may cause queueing back across the stopline. Queueing on Lambra Road may not be visible, increasing the risk of rear-end shunts.	9	Adding a waiting area in the middle of the junction for right turning traffic is outside the scope of the works. The new signs will alert drivers minimising the risk of rear end shunts.	6
D12 - Swept paths Siemens has not carried a swept path analysis on this junction. The roads appear to suitable with the exception of the Lambra Road approach where lanes appear to be very tight.	8	A swept path analysis should be carried out by the contractor to ensure lane widths and turning movements are suitable.	8
D14 - Visibility of pedestrians Pedestrians waiting to cross and crossing over Lambra Road will not be seen until drivers are roughly 20m from the stopline.	8	Signs to Diag. 543 'Traffic Signals Ahead' to be installed on Lambra Road.	6
D19 - Speed of the carriageway The speed of the carriageway is 30mph, but surveyed vehicles travel fast, particularly on Pontefract Road.	15	MOVA loop detection to be used with 2 seconds added on to the intergreen from all approaches to account for high speed vehicles.	5

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D21 - Location of maintenance bay A maintenance bay has not been provided as part of the works.	8	Maintenance vehicles can park on a nearby side road off Pontefract Road WB approach where the controller is easily accessible.	8

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